

WHAT IS CLAIMED IS:

1. A liquid crystal display device comprising pixels,
wherein each of said pixels has a plurality of memory circuits and a D/A
5 converter.
2. A liquid crystal display device comprising pixels,
wherein each of said pixels has n (n is a natural number equal to or greater
than 2) memory circuits and a D/A converter for converting digital signals stored in
10 said n memory circuits into analog signals.
3. A liquid crystal display device comprising pixels, each of said pixels
having a liquid crystal element to which analog signals are inputted,
wherein each of said pixels has n (n is a natural number equal to or greater
15 than 2) memory circuits and a D/A converter for converting digital signals stored in
said n memory circuits into said analog signals.
4. A liquid crystal display device comprising pixels,
wherein each of said pixels has $n \times m$ (n and m are both natural numbers
20 equal to or greater than 2) memory circuits and a D/A converter for converting n bit
digital signals stored in said $n \times m$ memory circuits into analog signals.
5. A liquid crystal display device comprising pixels,
wherein each of said pixels has $n \times m$ (n and m are both natural numbers
25 equal to or greater than 2) memory circuits and a D/A converter for converting n bit
digital signals stored in said $n \times m$ memory circuits into analog signals, and
wherein each of said pixels stores digital signals corresponding to m
frames.
- 30 6. A liquid crystal display device according to any one of claims 1-5,

wherein said memory circuits and said D/A converter are arranged so as to overlap a source signal line.

7. A liquid crystal display device according to any one of claims 1-5,
5 wherein said memory circuits and said D/A converter are arranged so as to overlap a gate signal line.

8. A liquid crystal display device comprising pixels, each of said pixels comprising:

10 a liquid crystal element; and
a source signal line, n (n is a natural number equal to or greater than 2)
gate signal lines, n TFTs having gate electrodes, n memory circuits, and a D/A
converter,

wherein each of said gate electrodes is connected to one of said n gate
15 signal lines, and each of said n TFTs has a source region and a drain region, one of
which is connected said source signal line and the other of which is connected to an
input terminal of one of said n memory circuits,

wherein an output terminal of each of said n memory circuits is connected
to an input terminal of said D/A converter, and

20 wherein an output terminal of said D/A converter is connected to said
liquid crystal element.

9. A liquid crystal display device comprising pixels, each of said pixels comprising:

25 a liquid crystal element; and
n (n is a natural number equal to or greater than 2) source signal lines, a
gate signal line, n TFTs having gate electrodes, n memory circuits, and a D/A
converter,

wherein each of said gate electrodes connected to said gate signal line,
30 and each of said n TFTs has a source region and a drain region one of which is

connected one of said n source signal lines and the other of which is connected to an input terminal of one of said n memory circuits,

wherein an output terminal of each of said n memory circuits is connected to an input terminal of said D/A converter, and

5 wherein an output terminal of said D/A converter is connected to said liquid crystal element.

10. A liquid crystal display device according to claim 8,

wherein said liquid crystal display device has a source signal line driving
10 circuit including shift registers, first latch circuits, second latch circuits, and switches, and

wherein said first latch circuits hold n bit digital signals upon receiving sampling pulses from said shift registers until said n bit digital signals are transferred to said second latch circuits, said switches select said n bit digital signals that have
15 been transferred to said second latch circuits one bit at a time to input said selected signals into said source signal line.

11. A liquid crystal display device according to claim 8,

wherein said liquid crystal display device has a source signal line driving
20 circuit including shift registers, first latch circuits, and second latch circuits, and

wherein said first latch circuits hold 1 bit digital signals upon receiving sampling pulses from said shift registers until said 1 bit digital signals are transferred to said second latch circuits.

25 12. A liquid crystal display device according to claim 9,

wherein said liquid crystal display device has a source signal line driving circuit including shift registers and first latch circuits, and

wherein said first latch circuits hold n bit digital signals upon receiving sampling pulses from said shift registers.

30

13. A liquid crystal display device according to claim 9,

wherein said liquid crystal display device has a source signal line driving circuit including shift registers and first latch circuits and n switches, and

wherein said first latch circuits hold n bit digital signals upon receiving
5 sampling pulses from said shift registers, said n switches input said n bit digital signals stored in said first latch circuits to said n source signal lines.

14. A liquid crystal display device according to any one of claims 1-5, 8,

and 9, wherein said memory circuits are selected from the group consisting of static
10 random access memories (SRAM), ferroelectric random access memories (FeRAM), and dynamic random access memories (DRAM).

15. A liquid crystal display device according to any one of claims 1-5, 8,

and 9, wherein said memory circuits are formed over one selected from the group
15 consisting of a glass substrate, a plastic substrate, a stainless steel substrate, and a single crystal wafer.

16. A liquid crystal display device according to any one of claims 1-5, 8,

and 9, wherein said liquid crystal display device is incorporated in one selected from
20 the group consisting of a mobile telephone, a video camera, a mobile computer, a head mount display, a television set, a portable electronic book, a personal computer, and a digital camera.

17. A method of driving a liquid crystal display device comprising a

25 plurality of pixels arranged into a matrix form,

wherein each of said plural pixels has a plurality of memory circuits and a D/A converter, and

wherein data are rewritten in said plurality of memory circuits of pixels in a specific row or pixels in a specific column out of all said plurality of pixels.

30

18. A method of driving a liquid crystal display device comprising a plurality of pixels and a source signal line driving circuit for inputting video signals into said plurality of pixels,

wherein each of said plurality of pixels has a plurality of memory circuits
5 and a D/A converter, and

wherein an operation of said source signal line driving circuit is stopped when a still image is displayed.

19. A method according to claim 17 or 18, wherein said memory circuits
10 are selected from the group consisting of static random access memories (SRAM), ferroelectric random access memories (FeRAM), and dynamic random access memories (DRAM).

20. A method according to claim 17 or 18, wherein said memory circuits
15 are formed over one selected from the group consisting of a glass substrate, a plastic substrate, a stainless steel substrate, and a single crystal wafer.

21. A method according to claim 17 or 18, wherein said liquid crystal display device is incorporated in one selected from the group consisting of a mobile
20 telephone, a video camera, a mobile computer, a head mount display, a television set, a portable electronic book, a personal computer, and a digital camera.

22. A method of driving a portable information device comprising a liquid crystal display device and a CPU, wherein:

25 said liquid crystal display device includes pixels, each having a plurality of memory circuits, a D/A converter, and a driving circuit for outputting signals to said plurality of memory circuits;

said CPU includes a first circuit for controlling said driving circuit and a second circuit for controlling signals inputted to said portable information device;

30 and

an operation of said first circuit is stopped when said liquid crystal display device displays a still image.

23. A method of driving a portable information device comprising a liquid crystal display device and a VRAM, wherein:

said liquid crystal display device includes pixels, each having a plurality of memory circuits and a D/A converter, and

an operation of reading data from said VRAM is stopped when said liquid crystal display device displays a still image.

10

24. A method of driving a portable information device comprising a liquid crystal display device, wherein:

said liquid crystal display device includes pixels, each having a plurality of memory circuits and a D/A converter, and

15

an operation of a source signal line driving circuit of said liquid crystal display device is stopped when said liquid crystal display device displays a still image.

25. A method according to any one of claims 22-24, wherein data in said plurality of memory circuits are read out once in one frame period.

20

26. A method of driving a portable information device comprising a liquid crystal display device, wherein:

25

said liquid crystal display device has a plurality of pixels arranged into a matrix form;

each of said plurality of pixels has a plurality of memory circuits and a D/A converter; and

30

said liquid crystal display device rewrites data in said plurality of memory circuits of pixels in a specific row or pixels in a specific column out of all said plurality of pixels.

